March 18, 1952 LE ROY DEMERATH 2,589,347

STAPLE STRIP CUTTING MECHANISM

Filed April 13, 1950

Fig. 1.

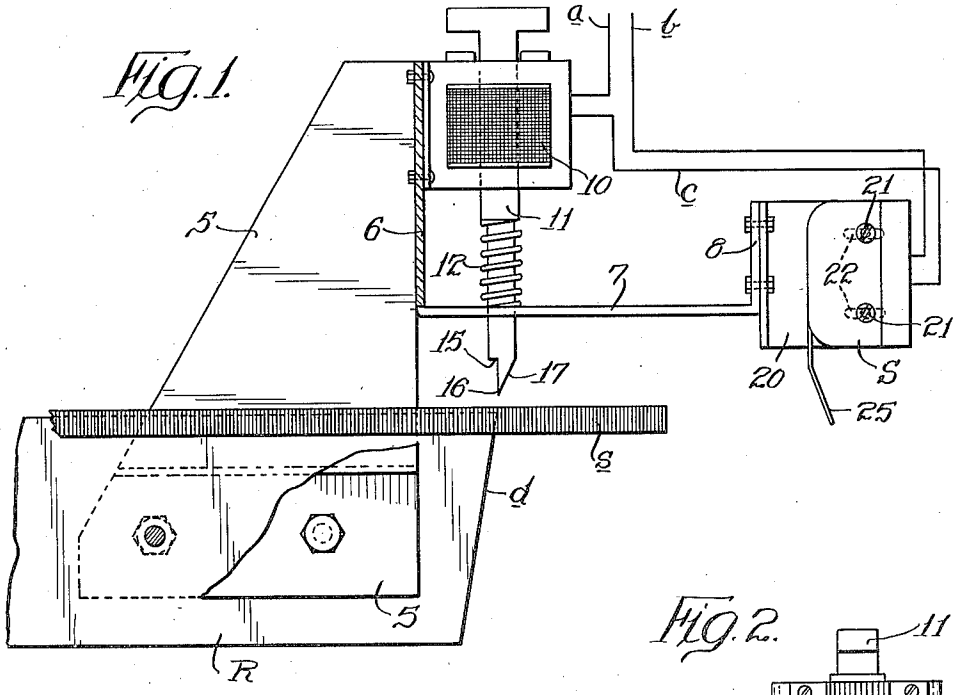


Fig. 2.

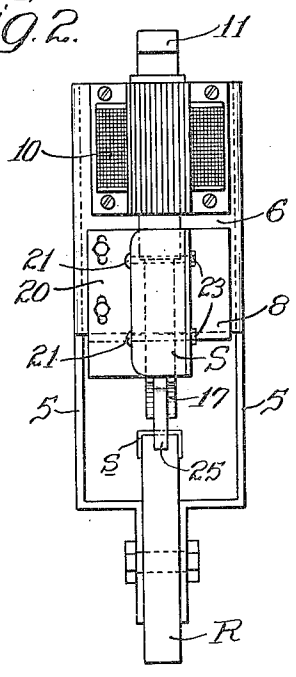
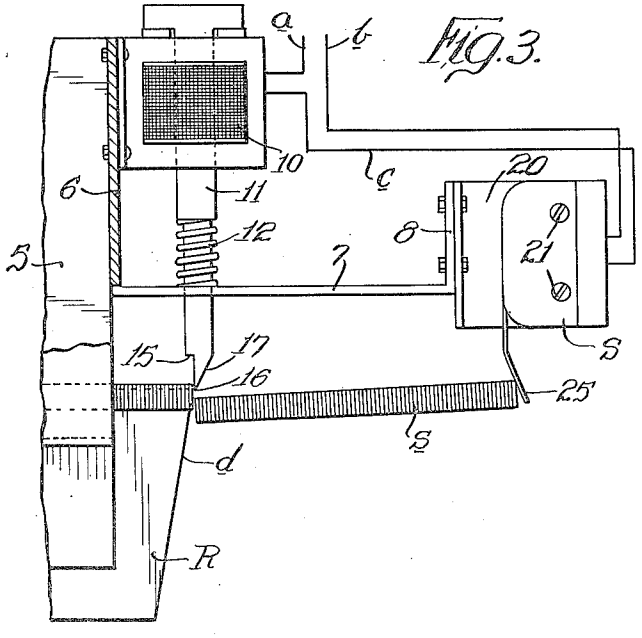


Fig. 3.



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STAPLE STRIP CUTTING MECHANISM

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2 Claims. (Cl. 164—47)

1

This invention relates to a mechanism by which to cut off from a staple strip a predetermined length of staples, the purpose being to provide, in repeated succession, a number of such lengths for packing into boxes or cartons preliminary to shipment to the user.

In the production of staples such as are prepared for use in various industries, offices and elsewhere, it is customary to unite these staples into strips. When and as formed in the factory, the staples are positioned in parallelism upon the top of a guide rail along which they are intermittently advanced. While straddling the rail, the undergoing advance lengthwise thereof toward the delivery end, the staples are subjected to application of an adhesive by which they are united into a strip. The guide rail is of a length sufficient for the adhesive to become set by the time the staples have arrived at the delivery end of the rail. At this point the strip is severed into short lengths, each exactly the same as the others. It is with an improved mechanism for severing the staple strip into relatively short pieces of predetermined length at the delivery end of the guide rail, that this invention is primarily concerned.

The present mechanism is characterized by the simplicity of the means employed and the dependability of its operation. A cut-off knife which is solenoid-operated is subject to control of a limit switch which is recurrently engaged by the advancing staple strip at a predetermined point. When operated, the cut-off knife severs the strip into a short length at a point which is substantially even with the delivery end of the guide rail whereon the strip is advanced. At and after the moment of severance, the solenoid plunger which operates the knife is advanced close to the fresh new end of the strip while remaining always spaced therefrom, the action being so rapid as not to interfere with the continued forward feeding movement of the staple strip.

A mechanism having these several features of construction, and which in practice has operated with entire dependability, is illustrated in the accompanying drawing wherein:

Figure 1 is a side elevational looking toward the staple guide rail and its associated frame whereon is carried the solenoid-operated cut-off knife for severing a predetermined length of staples from the strip;

Fig. 2 is an end elevation of the mechanism shown in Fig. 1, looking toward the delivery end of the guide rail and various of the parts associated therewith; and

2

Fig. 3 which is a view similar to Fig. 1, shows a severed length of staples when first separated from the staple strip.

The present mechanism includes a guide rail R having a desired length—say several feet—along which a strip of staples *s* may be advanced. The staples, as formed, straddle the top of the rail and are then united by a suitable adhesive or otherwise into a strip which advances along the rail toward its delivery end *d* and therebeyond for a predetermined distance. The guide rail, which is provided with a horizontal upper edge, has vertical side faces and it is of a size to receive and support a straddling strip of staples while the strip is being advanced along the guide rail to a position beyond the delivery end thereof. The mechanism for forming, uniting, and advancing the staple strip constitutes no part of this invention, and so need not be further adverted to.

Associated with the guide rail near its delivery end is a frame which may comprise a pair of spaced plates 5 interconnected by a wall 6 from which is forwardly extended an arm 7 having an upstanding end portion 8. This forward extension of the frame is, in effect, a bracket, but since it may also be regarded as part of the frame it will be so referred to hereinafter.

A solenoid having an electromagnetic coil 10 surrounding a vertically movable plunger 11 is fixedly mounted on the frame. The axis of the plunger approximately coincides with the vertical plane which touches the forward end of the guide rail. A coiled spring 12 which surrounds the plunger exerts opposing thrusts thereupon and upon the arm 7 to restore the plunger to an upward position. The lower end of the plunger is formed with a horizontal shoulder 15 and therebelow with a knife 16 adjacent which is a beveled face 17. The vertical plane of the knife substantially coincides with the forward end of the guide rail so that the shoulder 15 which extends rearwardly of the plunger axis overhangs a few of the staples at the end of the strip, although not engaging therewith, when the plunger has advanced downwardly to its limit.

At the extreme forward end of the frame is a mounting plate 20 to which is secured a limit switch S. This switch which is preferably of the snap action, light pressure, precision type, is secured in place as by bolts 21 which pass through its housing and through horizontal slots 22 in the mounting plate to receive nuts 23 by which to tighten the switch in a selected position of horizontal adjustment within the limits of the

slots 22. Depending from the switch is an operating lever 25 which is positioned in the path of the oncoming staple strip and inclined slightly away therefrom to be engaged thereby when it has advanced the necessary distance beyond the delivery end of the guide rail. This distance may be varied by adjusting the position of the switch S horizontally relative to its mounting plate 20.

The switch is interposed in a circuit having conductors *a* and *b* leading from a source of electrical energy, one connecting with the solenoid 10 and the other with the switch S. A conductor *c* interconnects the switch and solenoid. The switch which is normally open will close the circuit when the lever 25 is operated in response to contact from the advancing staple strip, thereby causing the solenoid 10 to be energized and the plunger 11 to be driven down. As a result, the knife 16 severs the staple strip at the delivery end of the guide rail, the short length of staples thus detached then dropping down into a container (not shown). In its gravity descent the severed piece of staples removes itself from further contact with the switch lever 25 whereupon the switch is automatically operated to open position to de-energize the solenoid and permit restoration of the plunger to its upper position where the cut-off knife remains clear of the staple strip whose intermittent advance is never halted. The time required for this entire cycle of operation is but momentary, so that movement of the knife into and out of the staple strip path is completed without any interference to the continued advance of the strip.

It is found that the severance of a staple strip into short lengths by the mechanism herein disclosed is advantageous in various particulars. In the first place, these short severed pieces are all of exactly the same length, and so pack well into small boxes provided for this purpose. Secondly, the length of these short severed pieces may be readily varied by adjusting the horizontal position of the switch, thus making it possible to fit the pieces into longer or shorter boxes, as desired. And finally, the length of the pieces so severed closely reflects the number of staples contained therein, so will serve for a practical count thereof.

I claim:

1. A staple strip cutting mechanism in which is comprised a guide rail having a horzontal upper edge and vertical side faces and being of a size to receive and support a straddling strip of staples while said strip is advanced to a position beyond the delivery end of the guide rail, a supporting frame associated with the guide rail adjacent its delivery end, a solenoid carried by the frame, a plunger movable within the solenoid and having a vertical axis disposed in a plane substantially coincident with the delivery end of the guide rail, a cut-off knife at the lower end of the plunger reciprocable vertically and movable downwardly to a point past the delivery end of the guide rail in close proximity thereto, a bracket arm carried by the frame and extended laterally therefrom in parallelism with the guide rail and above the advancing staple strip, a normally open switch carried by the bracket arm at a point above and ahead of the advancing staple strip, an operating lever for the switch depending therefrom in the path of the advancing strip, and circuit connections between a source of electrical energy and the solenoid and switch, the switch lever, when engaged by the foremost staple in the advancing strip, acting to close the circuit to energize the solenoid for driving the plunger and cut-off knife downwardly whereby to sever a predetermined length of staples from the strip at a point substantially even with the delivery end of the guide rail and clear of the switch and its supporting arm.

2. A staple strip cutting mechanism in which is comprised a guide rail whereon a straddling strip of staples may be advanced to a position beyond the delivery end of the guide rail, a supporting frame comprising spaced upright side plates secured at their lower portions to the guide rail at opposite sides thereof and outset therefrom at a point below the path of movement of the strip of staples, a wall interconnecting the upper portions of the side plates and an arm extending from said wall, a solenoid fixedly mounted on the interconnecting wall of the frame and located above said arm, a plunger movable within the solenoid and guided in the said arm and extending below the same, a cut-off knife at the lower end of the plunger reciprocable vertically and movable downwardly to a point past the delivery end of the guide rail in close proximity thereto, a normally open switch supported by said arm and spaced from the delivery end of the guide rail and movable to a closed position by a strip of staples, circuit connections between a source of electrical energy and the solenoid and switch, said switch when engaged and closed by the foremost staple in the advancing strip acting to close the circuit to energize the solenoid for driving the plunger and cut-off knife downwardly whereby to sever a predetermined length of staples from the strip at a point substantially even with the delivery end of the guide rail, and a coil spring surrounding the plunger and exerting opposing thrust upon the plunger and said arm to restore the plunger to an upward position.

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